

Appendix 1. ICD-10 Category Descriptions in NCHS Files, Ranked in Descending Order by U.S. Death Counts in 2017⁸

NCHS Category: Diseases of the Heart (I00-I09; I11 I13; I20-I51)	
I00-I02 Acute rheumatic fever	
I05-I09 Chronic rheumatic heart diseases;	
I11 Hypertensive heart disease	
I13 Hypertensive heart and chronic kidney disease	
I20 Angina pectoris	
I21 Acute myocardial infarction	
I22 Subsequent ST elevation (STEMI) and non-ST elevation (NSTEMI) myocardial infarction	
I23 Certain complications following ST elevation (STEMI) and non-ST elevation (NSTEMI) myocardial infarction (within the 28 day period)	
I24 Other acute ischemic heart diseases	
I25 Chronic ischemic heart disease	
I26-I28 Pulmonary heart disease and diseases of pulmonary circulation	
I30 Acute pericarditis	
I31 Other diseases of pericardium	
I32 Pericarditis in diseases classified elsewhere	
I33 Acute and subacute endocarditis	
I34 Nonrheumatic mitral valve disorders	
I35 Nonrheumatic aortic valve disorders	
I36 Nonrheumatic tricuspid valve disorders	
I37 Nonrheumatic pulmonary valve disorders	
I38 Endocarditis, valve unspecified	
I39 Endocarditis and heart valve disorders in diseases classified elsewhere	
I40 Acute myocarditis	
I41 Myocarditis in diseases classified elsewhere	
I42 Cardiomyopathy	
I43 Cardiomyopathy in diseases classified elsewhere	
I44 Atrioventricular and left bundle-branch block	
I45 Other conduction disorders	
I46 Cardiac arrest	
I47 Paroxysmal tachycardia	
I48 Atrial fibrillation and flutter	
I49 Other cardiac arrhythmias	
I50 Heart failure	
I51 Complications and ill-defined descriptions of heart disease	
NCHS Category: Malignant Neoplasms (C00-C97)	
Code range includes malignant neoplasms of all types	
NCHS Category: Chronic Lower Respiratory Disease (J40-J47)	
J40 Bronchitis, not specified as acute or chronic	
J41 Simple and mucopurulent chronic bronchitis	
J42 Unspecified chronic bronchitis	
J43 Emphysema	
J44 Other chronic obstructive pulmonary disease	
J45 Asthma	
J46 Status asthmaticus	
J47 Bronchiectasis	
NCHS Category: Cerebrovascular Disease (I60-I69)	
I60 Nontraumatic subarachnoid hemorrhage	
I61 Nontraumatic intracerebral hemorrhage	
I62 Other and unspecified nontraumatic intracranial hemorrhage	
I63 Cerebral infarction	
I64 Stroke, not specified if hemorrhagic or infarct	

I65 Occlusion and stenosis of precerebral arteries, not resulting in cerebral infarction
I66 Occlusion and stenosis of cerebral arteries, not resulting in cerebral infarction
I67 Other cerebrovascular diseases
I68 Cerebrovascular disorders in diseases classified elsewhere
I69 Sequelae of cerebrovascular disease
NCHS Category: Alzheimer's Disease (G30)
G30 Alzheimer's disease
NCHS Category: Diabetes (E10-E14)
E10 Type 1 diabetes mellitus
E11 Type 2 diabetes mellitus
E13 Other specified diabetes mellitus
E14 is an old code for unspecified diabetes mellitus
NCHS Category: Influenza and Pneumonia (J10-J18)
J10 Influenza due to other identified influenza virus
J11 Influenza due to unidentified influenza virus
J12 Viral pneumonia, not elsewhere classified
J13 Pneumonia due to Streptococcus pneumoniae
J14 Pneumonia due to Hemophilus influenzae
J15 Bacterial pneumonia, not elsewhere classified
J16 Pneumonia due to other infectious organisms, not elsewhere classified
J17 Pneumonia in diseases classified elsewhere
J18 Pneumonia, unspecified organism
NCHS Category: Nephritis, Nephrotic Syndrome, and Nephrosis (N00-N07, N17-N19, N25-N27)
N00 Acute nephritic syndrome
N01 Rapidly progressive nephritic syndrome
N02 Recurrent and persistent hematuria
N03 Chronic nephritic syndrome
N04 Nephrotic syndrome
N05 Unspecified nephritic syndrome
N06 Isolated proteinuria with specified morphological lesion
N07 Hereditary nephropathy, not elsewhere classified
N17 Acute kidney failure
N18 Chronic kidney disease
N19 Unspecified kidney failure
N25 Disorders resulting from impaired renal tubular function
N26 Unspecified contracted kidney
N27 Small kidney of unknown cause
NCHS Category: Other Diseases of the Respiratory System (J00-J06,J30-J39,J67,J70-J98)
J00 Acute nasopharyngitis [common cold]
J01 Acute sinusitis
J02 Acute pharyngitis
J03 Acute tonsillitis
J04 Acute laryngitis and tracheitis
J05 Acute obstructive laryngitis [croup] and epiglottitis
J06 Acute upper respiratory infections of multiple and unspecified sites
J30 Vasomotor and allergic rhinitis
J31 Chronic rhinitis, nasopharyngitis and pharyngitis
J32 Chronic sinusitis
J33 Nasal polyp
J34 Other and unspecified disorders of nose and nasal sinuses
J35 Chronic diseases of tonsils and adenoids
J36 Peritonsillar abscess
J37 Chronic laryngitis and laryngotracheitis
J38 Diseases of vocal cords and larynx, not elsewhere classified
J39 Other diseases of upper respiratory tract

J67 Hypersensitivity pneumonitis due to organic dust
J70 Respiratory conditions due to other external agents
J80 Acute respiratory distress syndrome
J81 Pulmonary edema
J82 Pulmonary eosinophilia, not elsewhere classified
J84 Other interstitial pulmonary diseases
J85 Abscess of lung and mediastinum
J86 Pyothorax
J90 Pleural effusion, not elsewhere classified
J91 Pleural effusion in conditions classified elsewhere
J92 Pleural plaque
J93 Pneumothorax and air leak
J94 Other pleural conditions
J95-J95 Intraoperative and postprocedural complications and disorders of respiratory system, not elsewhere classified
J96 Respiratory failure, not elsewhere classified
J98 Other respiratory disorders
NCHS Category: Septicemia (A40-A41)
A40 Streptococcal sepsis
A41 Other sepsis
NCHS Category: Symptoms, Signs, and Abnormal Clinical and Laboratory Findings (R00-R99)
R00-R09 Symptoms and signs involving the circulatory and respiratory systems
R10-R19 Symptoms and signs involving the digestive system and abdomen
R20-R23 Symptoms and signs involving the skin and subcutaneous tissue
R25-R29 Symptoms and signs involving the nervous and musculoskeletal systems
R30-R39 Symptoms and signs involving the genitourinary system
R40-R46 Symptoms and signs involving cognition, perception, emotional state and behavior
R47-R49 Symptoms and signs involving speech and voice
R50-R69 General symptoms and signs
R70-R79 Abnormal findings on examination of blood, without diagnosis
R80-R82 Abnormal findings on examination of urine, without diagnosis
R83-R89 Abnormal findings on examination of other body fluids, substances and tissues, without diagnosis
R90-R94 Abnormal findings on diagnostic imaging and in function studies, without diagnosis
R97-R97 Abnormal tumor markers
R99-R99 Ill-defined and unknown cause of mortality
NCHS Category: COVID-19
U071 COVID-19

COVID-19=coronavirus-19; ICD=International Classification of Diseases codes available at <https://www.icd10data.com/>;

NCHS=National Center for Health Statistics

Appendix 2. Relative Changes in Explained Versus Unexplained Deaths by Time Period, 2019-20 Versus Prior 5-Season Benchmark

	Total All-Cause Deaths	Total Explained Deaths ^a	Total Unexplained Deaths ^a	Unexplained (% of Total Deaths)
Pandemic awareness ^b				
Prior season mean benchmark	546,260	383,245	163,015	29.8
2019-20	560,736	388,280	172,456	30.8
% change from benchmark to 2019-20	2.7%	1.3%	5.8%	--
Initial pandemic peak period ^c				
Prior season mean benchmark	453,618	315,900	137,718	30.4
2019-20	588,710	429,301	159,409	27.1
% change from benchmark to 2019-20	29.8%	35.9%	15.8%	--
Pandemic post-peak ^d				
Prior season mean benchmark	821,482	565,731	255,751	31.1
2019-20	978,181	676,508	301,673	30.8
% change from benchmark to 2019-20	19.1%	19.6%	18.0%	--
Total, pandemic awareness through end of observation				
Prior season mean benchmark	1,821,360	1,264,876	556,484	30.6
2019-20	2,127,627	1,494,089	633,538	29.8
% change from benchmark to 2019-20	16.8%	18.1%	13.8%	--

^a Explained deaths are all-cause deaths reported in the specific categories of death included in the mortality files, including coronavirus-19. Unexplained deaths are all-cause deaths not reported in any of the categories of death included in the mortality files, plus deaths recorded as not elsewhere classified. ^b Weeks 17-26 (January 19 through March 28 in 2019-20 season). ^c Weeks 27-35 (March 29 through May 30 in 2019-20 season). ^d Weeks 36-52 (May 31 through September 26 in 2019-20 season).

Appendix 3. Overview of Changes in Reported Deaths During Pandemic Periods, 2019-20 Versus Prior 2-Season and 3-Season Benchmarks

	Total	Explained			Unexplained		
	All Causes	Reported UCOD, COVID-19	Reported UCOD, Not COVID-19 ^a	Total Explained ^b	UCOD Was NEC	Unreported: All-Cause Death, No UCOD ^c	Total Unexplained ^d
Pandemic awareness period^e							
Prior-season mean, 2-season benchmark	551,845	0	385,438	385,438	5,971	160,437	166,408
Prior-season mean, 3-season benchmark	551,951	0	385,863	385,863	6,058	160,030	166,088
2019-20	560,736	3,578	384,702	388,280	6,577	165,879	172,456
Change, 2-season benchmark ^f	8,891	3,578	-736	2,842	606	5,442	6,048
Change, 3-season benchmark ^f	8,785	3,578	-1,161	2,417	519	5,849	6,368
% of excess deaths, 2-season benchmark	100.0%	40.2%	-8.3%	32.0%	6.8%	61.2%	68.0%
% of excess deaths, 3-season benchmark	100.0%	40.7%	-13.2%	27.5%	5.9%	66.6%	72.5%
Initial pandemic peak period^e							
Prior-season mean, 2-season benchmark	458,044	0	317,107	317,107	5,051	135,886	140,937
Prior-season mean, 3-season benchmark	457,300	0	316,944	316,944	5,096	135,260	140,356
2019-20	588,710	93,843	335,458	429,301	6,061	153,348	159,409
Change, 2-season benchmark ^f	130,666	93,843	18,351	112,194	1,010	17,462	18,472
Change, 3-season benchmark ^f	131,410	93,843	18,514	112,357	965	18,088	19,053
% of excess deaths, 2-season benchmark	100.0%	71.8%	14.0%	85.9%	0.8%	13.4%	14.1%
% of excess deaths, 3-season benchmark	100.0%	71.4%	14.1%	85.5%	0.7%	13.8%	14.5%
Pandemic post-peak^e							
Prior-season mean, 2-season benchmark	829,780	0	567,619	567,619	9,639	252,522	262,161
Prior-season mean, 3-season benchmark	827,727	0	567,244	567,244	9,634	250,850	260,484
2019-20	978,181	82,482	594,026	676,508	15,345	286,328	301,673
Change, 2-season benchmark ^f	148,401	82,482	26,407	108,889	5,706	33,806	39,512
Change, 3-season benchmark ^f	150,454	82,482	26,782	109,264	5,711	35,478	41,189
% of excess deaths, 2-season benchmark	100.0%	55.6%	17.8%	73.4%	3.8%	22.8%	26.6%
% of excess deaths, 3-season benchmark	100.0%	54.8%	17.8%	72.6%	3.8%	23.6%	27.4%
Total changes, pandemic awareness through end of observation							
2-season benchmark ^f	287,957	179,903	44,022	223,925	7,322	56,709	64,032
% of excess deaths, 2-season benchmark	100.0%	62.5%	15.3%	77.8%	2.5%	19.7%	22.2%
3-season benchmark ^f	290,649	179,903	44,136	224,039	7,195	59,415	66,610
% of excess deaths, 3-season benchmark	100.0%	61.9%	15.2%	77.1%	2.5%	20.4%	22.9%

^a Sum of specific causes other than COVID-19 reported in the mortality files, including heart disease, cancer, chronic lower respiratory disease, cerebrovascular disease, Alzheimer's disease, diabetes, influenza-pneumonia, other respiratory illness, kidney disease, and septicemia. Diagnosis codes for each category are in Appendix 1. ^b Sum of specific causes plus COVID-19. ^c All-cause deaths not reported in any of the categories of death included in the mortality files, including those listed in footnote a, NEC deaths, or COVID-19. ^d NEC deaths plus unreported deaths. ^e Pandemic awareness is from weeks 17-26 (January 19 through March 28 in 2019-20 season). Initial pandemic peak is from weeks 27-35 (March 29 through May 30 in 2019-20 season). Pandemic post-peak is from weeks 36-52 (May 31 through September 26 in 2019-20 season). ^f 2019-20 values minus benchmark values. Bolded numbers are excess deaths. COVID-19=coronavirus-19; NEC=not elsewhere classified; UCOD=underlying cause of death.